Injection granuloma of the buttock

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Within one year in our hospital we have observed four cases with a gluteal mass which required surgical excision. The lesions in these cases all had a similar histological appearance of chronic granulomatous inflammation and we believe that they were due to the deposition of injection solution into the subcutaneous fat instead of the muscle in the course of intramuscular injections. We present these cases in order to draw attention to this complication of intramuscular injections which may present a diagnostic problem.

Case 1

A 22-year-old woman was admitted to the Sudbury General Hospital in April 1969, with a history of a lump in her right buttock which had grown from a small nodule since 1964. At that time she had been extremely ill in hospital with staphylococcal septicemia, for which she had injections of tetracycline, novobiocin and penicillin in both buttocks. She first noticed a small lump in her right buttock about six weeks after discharge from hospital but it did not trouble her until January 1969, when it began to increase rapidly in size and became very painful upon recumbency. Physical examination revealed a healthy-looking young woman who had a mass about the size of a grapefruit situated in the upper and outer quadrant of the right buttock and attached to the overlying skin, but not to the muscle. She was admitted for excision of what was thought to be a large granuloma and to exclude the possibility of a malignant tumour such as sarcoma. At operation the mass was excised. It was found to extend out into the buttock in thickened fibrous septa, but it gave no impression of being a malignant tumour. On frozen section it was reported to be a granuloma. It had a central cavity containing clear fluid which was cultured and found to be sterile.

Case 2

A 47-year-old woman, admitted in May 1968 for treatment of hallux valgus, had noticed for more than two months a lump in her right buttock. She had had a laparotomy in 1947 when a proposed hysterectomy had to be abandoned because of difficulty. Subsequently she had a course of penicillin injections for pelvic inflammatory disease. A lump slightly smaller than a tennis ball was removed from the right buttock just below the iliac crest. The mass extended down to, but did not extend into the fascia over the gluteus maximus and was fairly well encapsulated. The centre was degenerated and soft and contained what looked like pus, but culture failed to produce any bacterial growth. Her postoperative course was uneventful.

Case 3

A 25-year-old woman was admitted in December 1968 for removal of a mass in the right buttock, present for one-and-a-half years and recently increasing in size. Cholecystectomy had been performed two years before this admission. The mass was about 8 cm. in diameter, with dimpling of the overlying skin; it was fixed to the deep fascia. It was considered to be either a foreign body granuloma due to injections or a sarcoma. The mass was widely excised and the patient made an uneventful recovery.

Case 4

A 22-year-old woman presented with a lump in the left gluteal region. She was in the third month of her first pregnancy. Four months previously she had been treated at another hospital for quinsy by injections of an antibiotic into the buttock. A depressed, firm mass was palpable between the iliac crest and greater trochanter of the femur, measuring 13 x 10 cm. The overlying skin to which it was attached was slightly red. Because of her pregnancy and the impression that this lesion represented a chronic infection, a biopsy was not performed. She was given a course of ampicillin by mouth, following which the mass seemed to become a little smaller. A biopsy excision was performed two months later.

Gross appearance of the specimens

In each case the surgical specimen was a spherical or oval mass of tissue 4 to 6 cm. in diameter, surrounded by variable amounts of adipose tissue. The cut surface showed a central cavity containing soft yellowish or yellowish-brown material and occupying one-half to two-thirds of the mass. The wall of the cavity in each case was formed of pale grey tissue of firm, fibrous consistence with strands projecting into the surrounding fatty tissue. Present in the latter were small discrete greyish foci (Fig. 1).

Microscopic findings

Paraffin sections taken from representative areas were stained with

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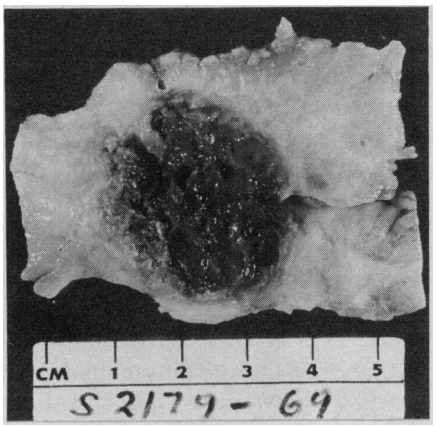

FIG. 1—Excised lesion (Case 1) showing cut surface. A large central area of fat necrosis is surrounded by a fibrous zone. Fibrous septa and smaller areas of necrosis are also present in the surrounding adipose tissue.

hematoxylin and eosin, Masson's trichrome, elastic Van Gieson and phosphotungstic acid hematoxylin. Frozen sections stained for lipid with Oil Red O were prepared from the central area in Case 1. Gram, Ziehl-Nielson and periodic-acid Schiff stains were used in Cases 2 and 4. In each case the lesion was limited to the subcutaneous fat; the overlying skin was normal. In no case was any muscle tissue removed.

The central brownish or yellow amorphous portions of tissue showed survival of fat cells in some areas; in others there was loss of fat spaces and replacement by larger empty spaces. Many of these were ringed with foamy and granular fat cells. Small amounts of fibrin and some amorphous eosinophilic material were seen.

Fibrosis was prominent in all cases. Strands of collagen were present between many of the enlarged fatty spaces. The pale, firm, grey zone surrounding the softened central area was composed largely of bundles of collagen. Much fibrous tissue was also present in the adipose tissue surrounding the main mass.

Inflammatory cell infiltration was present in each case. In Cases 1 and 3 patches of lymphocytes and foamy histiocytes accompanied fibroblasts and collagen in the peripheral zone. In Cases 2 and 4 foreign-body giant cells were a prominent feature in the peripheral area and, in company with foamy histiocytes, formed small granulomas in the surrounding fat. In these cases early giant-cell formation was observed in relation to breaking down fat cells. No organisms were seen in sections which were specially stained for bacteria and fungi.

In some places capillary blood vessels were a prominent part of the inflammatory reaction. A few instances of fibrous endothelial thickening of small arteries and arterioles were observed, but nowhere was this judged to be of a degree that would account for the necrotic changes in the adjacent fat.

Discussion

Four adult female patients with large gluteal masses are described. In each case the mass was enlarging when the patient was first seen and was removed surgically because of the suspicion of possible malignancy.

A careful history makes the differential diagnosis relatively easy. It lies principally between soft-tissue sarcoma or even a sarcoma arising from the ilium, and a granuloma. In two of the cases mentioned the correct diagnosis was made preoperatively. The characteristic hardness and fixity to the skin of this lesion excludes most other conditions.

An excisional biopsy was the preferred surgical management. When injection granuloma is the probable clinical diagnosis it would appear reasonable to treat the condition conservatively, especially if it is asymptomatic and small. It is interesting to note, however, that at least three of the tumours described began to enlarge some considerable time after their presence was first noted.

Pathological examination showed, in each case, stages in the transition from necrosis of fat cells to formation of dense fibrous tissue with inflammatory changes, sometimes with the presence of foreign-body giant cells as a frequent intermediate reaction. A large zone of softening surrounded by fibrous and inflammatory tissue constituted the main palpable mass, but there were other smaller lesions of similar type in the adjacent adipose tissue.

In three of the cases there was a definite history of intramuscular injections of antibiotics during a previous illness. In the fourth (Case 3) a cholecystectomy had been performed after which it is likely that intramuscular injections were given. The pathological changes observed were compatible with the long-term effects of a non-absorbed substance which had been injected into the fat instead of into the muscle. It is probble that unabsorbed solution or suspension first caused fat necrosis and that this initiated a series of changes culminating in fibrosis. The pathological appearances did not suggest the possibility of infection as a cause of any of the lesions.

It is a clinical impression that injections given directly into a muscle usually have no local pathological effect; this has been confirmed in animals that have been given a large number of injections of antibiotic into a single muscle.[1] In these experiments the fascial connective tissue (including adipose tissue) overlying the muscle did show inflammatory change. The exemption of muscle from harmful effects of injected substances is probably related to its abundant blood supply. Adipose tissue, being much poorer in drainage channels, retains injected substances for a much longer period and so is more subject to harmful effects.

The fact that each of these patients was an adult female prompted us to enquire whether women are more likely to receive injections into the adipose tissue of the buttock on account of a thicker fat pad in that location. We measured the vertical thickness of the subcutaneous fat at a point in the upper outer quadrant of the buttock approximately 8 cm. below the iliac crest in a random series of more than 40 autopsy cases at this hospital. These comprised both cases of sudden death and of death after a prolonged illness. There was no definite relationship between the terminal illness and the thickness of the subcutaneous gluteal fat in these cases. There was a striking difference between the two sexes; in most of the females the thickness of fat exceeded 4.3 cm. while in all the males it was less than 4.0 cm.

We have enquired at a number of hospitals in various parts of Ontario and have found that nurses are generally instructed to use a 3.75-cm. (1½-in.) disposable 22-gauge needle for intramuscular injections (unless the solution is particularly viscous, in which case occasionally a 20-gauge needle is used). The site favoured for injection in the majority of cases is the upper outer quadrant of the buttock. Our measurements show that the 3.75-cm. needle does not penetrate through the subcutaneous fat into the gluteus maximus muscle in most adult females. In an occasional subject, at autopsy the track of the injection needle used shortly before death has been actu-

ally identified as a line of a hemorrhage passing inwards from the skin, and this was seen to terminate in a wide hemorrhagic zone in the fat where the injected solution was released. The underlying muscle was unmarked. We would therefore recommend for the administration of intramuscular injections to adult women either that a needle longer than the standard 3.75 cm. one be used for the upper outer gluteal site or, since this length of disposable needle is the one now most commonly available in hospitals, that another site be selected for the injection. The standard location in the gluteus maximus is, furthermore, open to other dangers, such as sciatic nerve injury and vascular involvement.[2] The deltoid muscle and the rectus femoris are still commonly used for injections. An objection to the deltoid muscle site is the danger of damage to the radial and circumflex nerves, while injections into the rectus femoris, though considered safe for intramuscular injections, are unduly painful.[3] In 1956 von Hochstetter described the area of the ventral gluteal muscles as a safe site for injections. The subcutaneous fat in this area is not as thick as in the posterior gluteal region (in the cadaver we have found it to be always less than 3.75 cm. in thickness), so that a needle of this length may be safely used for intramuscular injection. We would therefore advise the use of the gluteus medius for intramuscular injections in preference to the classical upper-outer quadrant of the buttock.

To locate the site of the ventral gluteal injection for the left side, place the right index finger pointing towards the patient's head on the left anterior superior iliac spine and splay the index and middle fingers as far as possible along the iliac crest. The injection should be given within the triangular space enclosed by the index and middle fingers and the iliac crest. It is useful first to touch the bone with the needle point and then to withdraw the needle slightly; in this way one is certain that the tip of the needle is in the gluteus medius muscle.

Another factor in the pathogenesis of injection granuloma is present when multiple injections are given at the same site. In these cases there must be a considerable degree of trauma to that area from the needle alone. This may be reduced by alternating the injection sites when multiple injections are required.

Yet a third factor in the production of the granulomatous lesions may be a vascular one. Injections may be given to patients who are hypovolemic and hypotensive, when there can be resultant functional ischemia of the subcutaneous fat. In these circumstances inadvertent injections into fat, which might normally be absorbed with no ill effects, could be delayed in their absorption and so be more likely to lead to fat necrosis. It is therefore most important to ensure an accurate injection into muscle under these conditions.

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